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ENERGY

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NOTES FOR A STATEMENT

BY

THE HONOURABLE DONALD S. MACDONALD

MINISTER OF ENERGY MINES AND RESOURCES

TO THE

STANDING COMMITTEE ON NATIONAL RESOURCES

AND PUBLIC WORKS

It is of course very convenient to us here to make a demand in a short and simple as a "national energy policy". To state it that way is to make it sound like a simple thing to do. If there could be one I suspect it would be to do what we are already doing — to ensure adequate supplies of all energy resources to Canadian consumers at reasonable prices. That kind of statement could of course satisfy no one and only provide over the long term a technical and economic challenge and decision which has to be made. Obviously, there can be no one energy policy — while we are one place in the singular it is for convenience only — we must con-

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MINISTER OF ENERGY
MINES AND RESOURCES

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Mr. Chairman and Committee Members:

I would at this point turn the attention of the committee to a discussion of departmental activities, beginning with a brief comment on the energy sector.

ENERGY SECTOR

As the members of this Committee will know, the past year has seen a dramatic increase in the awareness of the general public of the consumption of energy by Canada and other industrialized nations of the world and the finite supplies which exist to meet those needs. In spite of the favourable resource base in Canada the shortages being faced elsewhere, particularly in the United States, have prompted concerns over the level of energy exports from Canada, and a call for a "National Energy Policy".

It is of course very convenient to be able to couch a demand in a phrase as simple as a "National Energy Policy". To state it that way however, is misleading on at least two counts: first of all there can be no such thing as a single energy policy. If there could be one I suppose it would be to the effect that our policy is to assure adequate supplies of all energy commodities to Canadian consumers at reasonable prices. That kind of statement would of course satisfy no one and only glosses over the many technical and economic challenges and decisions which face us. Obviously, there can be no one energy policy -- while we use the phrase in the singular it is for convenience only -- we must con-

sider a whole host of problems and policies to arrive at a rational set of policies which can adapt to changing conditions within all segments of the energy industries.

The second misconception is that we have no so-called Energy Policy at this time. That of course is not the case. The government is administering policies which have evolved over the years and which relate to such diverse subjects as export controls on electricity, uranium, oil and gas; the licensing of interprovincial pipelines; the administration of oil and gas permits and leases on Canada lands; assistance to energy oriented research and development; cooperation with the provinces in the planning and financing of electric transmission interconnections; the stockpiling of uranium, etc. Accordingly, the problem which faces us today is whether or not this framework of policies which worked in the 60's is adequate to meet the challenges of the 70's and the 80's.

When the government established the Department of Energy, Mines and Resources in 1966, one of its principal objectives was to develop within one agency a competence which would encompass all aspects of the energy industries of Canada and to charge that Department with the development and coordination of energy policy recommendations. It was obvious at that time -- and it is certainly abundantly clear today -- that there had to be a central coordinating agency if meaningful policies are to evolve.

The Department, with a very limited staff, has been extremely active over the intervening years. Its major effort over the past year takes the form of the energy policy papers which will be made available to the public later this Spring. While I cannot comment on these papers at this time, I believe that they represent the results of the most intensive study ever undertaken on the role of the energy industries in Canadian society. However, they are not the be all and end all -- the experts would be the first to admit this. There is a great deal of further analysis needed and in many areas critical information is lacking. Add to this the rapidly changing world events relating to energy and it becomes obvious that the type of analysis which has been carried out -- and which will be reported on in our documents, will be only a snapshot of a rapidly changing scene. More and better analyses are needed on a continuing basis -- the estimates of the Department for fiscal year 1973-74 provide for a continuation and some acceleration of the existing program.

With that introduction to the importance and urgency of the Department's energy role it would be useful to quickly review current areas of activity and new programs for the coming year. The Committee will of course have an opportunity to consider the energy policies studies at a later date and departmental officials and I will be pleased to appear before you at that time.

A nation's energy policies can only be as good as its knowledge of the resources which will be available. In a land as vast as ours that

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poses a problem of immense proportions. Canada's future petroleum needs will depend on the undiscovered resources of our frontier regions where exploration only began with any degree of intensity within the last five years and where many areas are dependent on new technology -- if not for exploration, certainly for safe and economical production and transportation. The Athabasca oil sands hold an immense wealth, but here again technological advances are required to permit the economic exploitation of most of this resource.

At the Mines Minister's Conference in 1972 I announced that my Department would be undertaking a comprehensive study of the energy resources of Canada. It will draw on the expertise of the geologists, scientists, engineers and economists of all parts of the Department and will represent the first such independent program of analysis ever carried out by the government.

While emphasis will initially be on the oil and gas potential of Canada, the inventory program will also encompass coal and uranium. The Department is continuing its cooperative study of the lignite resources of Saskatchewan with the government of that Province and is actively reviewing with the Province of Alberta plans for a similar study in its coal belt. Hopefully, the survey will eventually extend into British Columbia. These three provinces possess 99% of the coal resources of Canada.

Further efforts to inventory the uranium resources of Canada will be expensive as they will involve costly air surveys. The estimates for the coming year provide for only a very modest increase in these activities.

The inventory programs will encompass not only an assessment of the probable resources in the ground but, where data is available, it will assess the quality of that resource. Another critical element will be a projection of the probable cost of finding, production and transportation. Only when a resource can be won at a reasonable cost does it become a true asset to the nation.

The energy papers which will be available to you later this spring will set forth the results of the Department's first coordinated effort in this very important activity. It is an effort which will require increased funding in the years ahead and the accuracy of the results also depend to a considerable extent on a continued exploration program by industry.

Time will not permit a point by point analysis of all energy related activities of my Department. I have elaborated to some extent on the inventory as it represents a major element of funding in this new fiscal year. The following brief observations on a few of the other activities perhaps runs the danger of obscuring their importance but I or my Departmental officials will be glad to elaborate if you so wish.

NORTHERN PIPELINE STUDIES:

My Deputy Minister chairs the Interdepartmental Task Force on Northern Oil Development and he and his staff are actively engaged in all the many areas of activity such as the different transportation modes possible the environmental and social impact, and the economic impact of major pipeline projects. Most of the studies relating to the movement of northern gas will be completed this year and will permit an intensive review by government of a possible pipeline application.

CANADA-U.S. OIL AND GAS RELATIONS

My Deputy Minister also chairs the Interdepartmental Committee on Oil which, among other matters, has been giving particular attention to factors relating to the marketing of Canadian oil and gas in the United States. Because of the many evidences of an energy shortage in the United States there is increasing U.S. demand on Canadian resources. While exports can be controlled so as to safeguard future Canadian requirements, U.S. demand is putting upward pressure on prices of fuels in this country and we are evaluating ways of minimizing this impact. We are also continuing security of supply discussions with the United States.

FEDERAL-PROVINCIAL OIL AND GAS RELATIONS

Among matters under discussion with the provinces are fuel prices, deep water ports and the impact of provincial regulations on oil and gas availability. We have good working relations with the provinces on these and other matters.

ECONOMIC IMPACT STUDIES:

In addition to studies of the impact of individual projects on the economy, the Department has been assessing the total capital needs of the energy industries over this decade and the economic impact of various options with regard to a major project or the timing of projects. Here again the results of our studies to date will be published in our energy papers, but this important activity must go on so that we can better understand the advantages and disadvantages of major, capital intensive energy developments.

URANIUM MARKETING:

The Department monitors closely world trends in the demand for uranium and the price movement. The staff is also heavily engaged with the joint stockpiling agreement between Uranium Canada Limited and Denison Mines and the sale of the stockpiled material to Spanish utilities. Various options for the disposal of the other government uranium stockpiles are also being explored.

URANIUM ENRICHMENT:

Government guidelines are being developed which will set forth the conditions under which the government will entertain plans for the construction of an uranium enrichment plant in Canada.

CANADA'S NUCLEAR PROGRAM:

Assessments of the role of nuclear energy in various areas of Canada will continue. Comparisons will be made with the economics of other forms of generation and discussions held with provinces planning the addition of a nuclear component to their utility.

FEDERAL-PROVINCIAL POWER PLANNING:

The Department will continue its role in joint study and development programs with the provinces. Current projects include a review of the economics of Bay of Fundy tidal power, technical assistance to the Newfoundland Subcommittee on Energy, an offer of financial assistance to strengthen the electrical interconnection between Nova Scotia and New Brunswick, a study of an underwater power cable to Prince Edward Island, and responsibility for ensuring that the terms of the Nelson River Transmission agreement and the Columbia River Treaty are met.

INTERNATIONAL LIAISON:

The Department plays a major role in scientific exchanges with the Soviet Union relating to electrical energy and oil and gas activity under extreme northern conditions. Canada and the Soviet Union share many common problems relating to climate and distance, and sharing of experiences and discussion of technology cannot help but be of assistance.

COAL MARKETING:

Departmental experts continue their studies of the world coal trade and competition from other major producers of metallurgical coal and opportunities to diversify Canadian markets.

RESOURCE ADMINISTRATION:

The federal interests in the mineral resources of Canada's offshore regions, excepting the high Arctic Offshore, are administered and managed by the Resource Management and Conservation Branch. The rate of expenditures for exploration activity in Canada's offshore areas has been increasing rapidly, from \$22 million in 1969 to \$66 million in 1972 and will continue to increase, with the emphasis now on exploratory drilling off the East Coast. The Branch must not only administer the large offshore areas under permit in accordance with the Canada Oil and Gas Land Regulations, but must also provide regulatory control and supervision for all offshore operations by authority of the Oil and Gas Production and Conservation Act.

There are also other important matters with which the Branch is involved, including, federal/provincial negotiations on offshore mineral rights, and the drafting of enabling legislation and federal/provincial

agreements; designing new oil and gas regulations pursuant to the Oil and Gas Production and Conservation Act; preparation of extensive amendments to the Canada Oil and Gas Land Regulations (the first such overhaul in 12 years) and others.

L'ÉVALUATION GÉOLOGIQUE ET L'ENSEMBLE DES RESSOURCES

La structure géologique du Canada est formée de l'ensemble de ses ressources, lesquelles comprennent notre énergie et nos richesses minières et hydrauliques. Par conséquent, nous avons établi un inventaire continu de la géologie de notre pays, dont la phase de reconnaissance est sur le point d'être complétée.

De nos jours, dans une civilisation sans cesse plus complexe et plus grande, des facteurs géoscientifiques concernant l'utilisation du sol, l'environnement et son écologie, l'expansion urbaine et industrielle de l'Arctique et les problèmes de transport s'y rattachant, l'usage potentiel des plateaux continentaux, la protection contre les caprices de la nature et les besoins récréatifs et autres, ont créé des exigences qui requièrent une information géoscientifique spécialisée dans un avenir rapproché.

De nombreux projets connexes, comme les tracés des pipe-lines, la gestion des ressources et la prévention de la pollution doivent se concrétiser le plus rapidement possible.

L'inventaire géoscientifique de base est donc d'une importance capitale pour le Canada et l'un des principaux objectifs du Ministère. C'est un aspect qui passe souvent dans l'ombre, à cause de l'urgence de certains projets temporaires.

Des évaluations sûres et complètes de notre potentiel énergétique n'en sont pas moins importantes. Les évaluations actuelles de ce potentiel effectuées par l'entreprise privée sont grandement élaborées, mais ce n'est que depuis l'année dernière que les géologues du gouvernement ont commencé à effectuer les premières évaluations indépendantes. Les prévisions budgétaires pour 1973-74 comprennent une augmentation des fonds et du personnel en vue de l'expertise de certains aspects géologiques déterminés, dont dépendent les évaluations des ressources énergétiques. Si des évaluations plus approfondies de notre potentiel énergétique s'avèrent nécessaires au cours des trois ou quatre prochaines années, d'autres augmentations budgétaires s'imposeront.

À la suite de découvertes de puits de pétrole et de gaz dans l'Arctique et au large des côtes atlantiques, la mise en valeur de ces réserves amènera sous peu la construction de pipe-lines et l'établissement d'autres moyens de transport pour les acheminer vers les marchés. L'étude des terrains, par exemple les dépôts glaciaires non consolidés, les sédiments du sol et sous-marins, le pergélisol, les érosions de la glace dans les régions côtières et autres facteurs deviendront des éléments majeurs à considérer quant à l'emplacement des pipe-lines, lesquels créeront des impacts majeurs sur l'économie, l'écologie et l'environnement. Des données de reconnaissance sont actuellement disponibles et des employés du Ministère sont retournés à l'oeuvre, depuis le fleuve MacKenzie jusque dans les îles de l'Arctique, des deux côtés de la Baie d'Hudson et au large de la côte atlantique.

Another problem of equal importance but somewhat less urgency is the limited knowledge of Canada's endowment of minerals, nationally and regionally. Best available estimates are liable to errors of an order of magnitude and are unacceptable either for policy on national issues or for planning regional development in Canada. These estimates are dependent upon geological factors of much greater complexity than those pertaining to fuels and thus require greater lead time. For these reasons increasing emphasis is placed on geoscience surveys and research in the field of mineral deposits.

MINES BRANCH AND RESOURCE USE

I mentioned earlier the importance of an oil and gas inventory and would relate that discussion to the activities of the Mines Branch.

In the 1973-74 budget, Mines Branch received additional support to analyse oil and gas samples in the determination of our resource potential. Energy, Mines and Resources obtains oil samples directly from companies in the field, and from the analysis is able to assess values in terms of the hydrocarbon products that oils are capable of producing. Gas analysis is mainly concerned with work done in cooperation with the Alberta Energy Resources Conservation Board, and an increasing amount of work will be done on analysis of samples from the Athabasca Tar Sands. A large proportion of our increased capability to do analyses in this area will be focussed on the potentially large, low-grade resources. This has special significance, of course, for the Athabasca bitumen and the low-grade crudes in Saskatchewan, which must be processed to a high degree before suitable commercial products become available.

Full knowledge of the quality of these materials must be made available if we are to assess the Canadian resource potential for energy materials, and our Ottawa laboratories are the only independent source of analytical capability in Canada for such a purpose.

The following items have arisen out of recognized needs within the past year or so, but our activities which have been funded out of previous appropriations will be significant in their effect in the fiscal year 1973-74:

1. A pilot plant project to remove sulphur and increase the value of Nova Scotia coal is underway and will be completed in 1973. This work is associated with new developments in Cape Breton Island at the Lingan Mine, and as the result of this work we expect it will be possible to treat and produce coal from this area that will be competitive with foreign coals in world markets.
2. In Edmonton, laboratory facilities are in the process of being expanded to evaluate western coals for their coke making qualities and to investigate the feasibility of improving the quality of these coals by various cleaning methods.
3. In recognizing the rapidly growing importance of the tar sands in Canada's energy picture, we will continue to make the best use of our resources in conducting studies in new avenues of technology associated with tar sands development, i.e., the processing technology of producing marketable products from the bitumen, and with problems associated with current practices in processing and extraction that are largely concerned with environmental matters.

4. The program of evaluating pipe for oil and gas transmission in the Arctic, which was started about a year ago, will continue in 1973-74.
5. The Pit Slope Stability Program, which represents a major effort of the department in terms of contract research, will go into its second year of operation.
6. The Mines Branch has a major portion of its effort tied up in various projects related to environmental problems that are associated with the mineral and metallurgical industries. This accounts for approximately 30% of our total budget and is mainly directed at developing new methods of processing and recovery of mineral resources that will reduce environmental problems. In particular, emphasis is being placed on hydrometallurgical methods of processing ores that would eliminate the SO_2 effluent from stack gases that are associated with pyrometallurgical methods.
7. The Branch has also recognized the increasing emphasis on the need for further processing of our resources in Canada and more attention is being given to the science and technology of increasing the value added component of ores, minerals and their products for the benefit of Canada.

PROGRAMMES DES SCIENCES DE LA TERRE

La section "Recherches en géophysique" du programme des sciences de la Terre traite principalement des propriétés physiques de la masse continentale du Canada et de la structure de cette masse continentale par rapport à l'ensemble de la Terre. Ces études aident à comprendre les principaux

processus d'évolution de la géologie canadienne ainsi qu'à en évaluer les risques. On poursuit également des programmes techniques sur la gravité, le géomagnétisme, la séismologie et on fait aussi des études géothermiques et géodynamiques.

Le programme sur la gravité fournit les normes nationales, les moyens de contrôle, les cartes ainsi que les indications requises pour la mise en valeur des ressources, pour la défense nationale et la recherche géoscientifique. Les cratères météoriques et la physique des roches font également l'objet d'études connexes.

Le programme géomagnétique décrit et interprète le champ magnétique de la Terre et ses variations au cours des années, à travers le Canada, comme l'exigent la mise en valeur des ressources, la navigation, les télécommunications, la défense nationale et la recherche géoscientifique.

Le programme séismologique implique l'établissement et le fonctionnement d'un réseau national d'observatoires sismiques et l'interprétation des données recueillies afin d'évaluer les risques de tremblements de terre au Canada. Ces données serviront aussi à prendre les dispositions qui s'imposent dans les régions sujettes aux secousses sismiques et fourniront des renseignements techniques relatifs au problème des essais nucléaires. Le Canada pourra, à l'aide des données recueillies, participer au programme mondial de surveillance des tremblements de terre. Des sondages sismiques en profondeur et d'autres tests sont de plus effectués en vue d'étudier l'évaluation de la masse continentale canadienne.

Le programme géothermique détermine tout le système géothermique du Canada, de façon à fournir des renseignements quant aux phénomènes souterrains à grande profondeur; on y trouve des informations sur le pergélisol et les températures souterraines appropriées aux besoins des industries qui exploitent les ressources et aux agents régulateurs.

Le programme géodynamique mesure et analyse les mouvements habituels de la Terre, dont la rotation de la Terre, le mouvement polaire et les marées terrestres; on y étudie les déformations de la Terre, sous l'effet de pressions naturelles et artificielles et on en interprète les renseignements recueillis en termes de propriétés du centre de la Terre.

SURVEYS AND MAPPING

In addition to ongoing surveys and mapping programs, there are a number of thrusts in the activities relating to northern and pipeline development and the offshore. This year we will be introducing for the first time satellite positioning systems which will make it possible to provide an accurate framework of control in the Arctic for the positioning of offshore oil explorations, and as a framework on which to map proposed pipeline routes from the Arctic. While the main thrust of this activity will not take place until 1974, work on developing the satellite measuring system and experimenting for the difficulties of offshore positioning will be carried out this summer.

LEGAL SURVEYS OF INDIAN LANDS

With the decentralization of Legal Surveys we are able to provide a more effective service for the Indian communities. More money is being contracted to private land surveyors, in fact, most of the survey work is being carried out by private industry.

COST RECOVERY ON PRODUCTS

There is a definite move toward full cost recovery for the printing and sale of maps, publications and air photo products with the aim of reducing the amounts included in the budgets. A start will be made in 1973-74 and accelerated in 1974-75.

NATIONAL ATLAS

The Fourth Edition of the National Atlas is nearing completion and should be available to the public in June this year. Work is already started on the Fifth Edition of the Atlas and social-economic portions of this atlas are scheduled to be published in 1976.

REMOTE SENSING PROGRAM

Nasa's Earth Resources Technology Satellite ERTS-1 was successfully launched on July 23, 1972. The Remote Sensing Centre of EMR was prepared to receive the data at the Prince Albert Satellite Station and process them at Ottawa for reproduction and distribution to a large number of Canadian users. This satellite is expected to last until 1975. All orbits over Canada will be recorded and processed and the data made available at the cost of reproduction. Many users all across the country are developing interpretation techniques for interpreting the imagery and are beginning to use it on a regular basis.

AIRBORNE PROGRAM

1973-1974 will be the 3rd year of operation for the airborne remote sensing program. One Falcon, one CF-100 and two Dakotas are operated by the Canadian Forces, Airborne Sensing Unit, under contract to EMR using various remote sensing devices such as infrared line-scanners, multi-spectral camera systems and mapping

cameras containing colour infrared film. Government and university users have proposed projects for these aircraft, in geology, forestry, agriculture, hydrology, water pollution and ice reconnaissance. Federal government users will pay \$2.00 per mile for these data. Next year all users will be charged 50% cost recovery and during 75/76, full cost recovery will be charged.

APPLICATIONS DEVELOPMENT PROGRAM

During 1973-74 staff are being recruited to develop computer methods of analysing satellite and remote sensing data using the Canadian Centre for Remote Sensing ("CCRS") ground data handling centre. These methods will be made available to the users.

SENSOR DEVELOPMENT

Several new sensors developed under outside contract during the last 3 years are coming to fruition. A device for profiling sea ice thickness from aircraft will be tested. Other devices for detecting and tracking oil spills on the ocean's surface will be tested. Eleven sensors in all, some of which may prove to have application from satellites, are in various stages of development. They are specified to meet particular Canadian needs.

POLAR CONTINENTAL SHELF

The Polar Continental Shelf Project ("P.C.S.P.") provides logistic support in the Canadian Arctic for projects varying from archaeology to zoology. This logistic support in the main is centred around our bases at Resolute and Tuktoyaktuk.

Some 70 different scientific projects will be supported by P.C.S.P. during the 1973 field season. This includes support to EMR projects, other

departments such as DND, DOE, DIAND, and the National Museum of Canada as well as several Canadian universities, provincial organizations such as Quebec Wildlife Service.

There has been international co-operation through the AIDJEX Project, the Northern Water Study, The International Biological Program (IBP), the Arctic Institute of North America and the Scott Polar Research Institute. Several contracts with university departments and doctoral students have been carried because they pertain particularly to research in the properties of ice.

MINERAL RESOURCES

Mineral resources have been a major factor in the overall prosperity and economic development of this nation. Indeed our minerals (excluding oil and gas) are responsible for about 26% of our total exports. Forty per cent of railroad carloadings and 44% of inland waterway freight are mineral materials, and 10% of heavy construction is the result of utilizing these resources.

Mining and primary processing together account directly for 5.6% of the Gross National Product, 3.1% of employment and 4.5% in wages. If you include indirect contributions, the last three figures would read 14%, 8%, and 12%.

We can justly be proud of the past performance of a strong and competitive mineral industry which has grown at an average annual rate of 5½% since 1945.

However, developing international events are creating uncertainty for the future contribution of our mineral resources. Changing international relations could affect Canada's traditional trade patterns and hence have

serious repercussions for our share of world mineral markets.

On the domestic front, a growing desire for greater industrialization is adding impetus to the need to re-examine the adequacy of our mineral resources to meet domestic requirements as well as international demands. What rate of mineral development is possible and desirable to ensure greater returns to both present and future generations of Canadians? Problems such as this are intertwined with the contribution of mineral development to regional economic growth, to stronger secondary manufacturing, to increased income and employment levels, and to closer federal provincial relations.

New initiatives in the development of domestic and international strategies by Canada are required. The major levels of government together with industry must join together in the implementation of these strategies if Canada is to meet the challenges and opportunities of a changing international environment and satisfy the aspirations of its citizens for greater economic and social prosperity. It is within this context that the mineral development activities of EMR take place.

During 1973-74, the Department will be heavily involved with the development of a national minerals policy. Preliminary consultations have been initiated with the provinces, and 1973-74 should bring more detailed discussions on the objectives for such a policy as well as the development of alternative strategies.

Policies for specific mineral commodities will also be examined. You may recall the difficulties that the country faced with its copper contracts and its potash resources. Opportunities for further processing for certain mineral commodities will also be of importance to the government.

Date Due

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11/4/73

MACDONALD, D.S.

AUTHOR

Notes for a statement to the stand-
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MACDONALD, D.S.

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The study of resource adequacy and the economic potential of our mineral resources will be continued, as well as maintaining the joint EMR-DREE contribution to regional development needs of the provinces. Mineral economic research to support these endeavours is also proposed.

SUBVENTIONS POUR LA RECHERCHE SUR LES RESSOURCES MINÉRALES

Vu que la plupart des travaux internes effectués dans le secteur de la mise en valeur des minéraux ont trait aux renseignements sur l'économie minérale, le Ministère reconnaît que ce secteur devrait recevoir plus d'aide de l'extérieur pour poursuivre le but qu'on lui a fixé. De plus, les problèmes grandissants de nature économique et politique dans le secteur des minéraux, vis-à-vis du peuple, ont amené le monde universitaire à s'intéresser à les solutionner. Il est par conséquent proposé que les subventions à la recherche soient continuées, afin d'appuyer les initiatives du Ministère.

GRANTS TO NEWFOUNDLAND MINERAL DEVELOPMENT PROGRAM

The Canada-Newfoundland and Labrador Mineral Exploration and Evaluation Program started in mid-1971 and planned for termination in mid-1975. This is a joint EMR and DREE project at total cost of \$2.7 million. In general, the program includes an inventory of mineral deposits in the province; the assessment of mineral development opportunities and problems; the training of 30 persons in the technique of mineral exploration; a mineral evaluation survey of high potential minerals; the provision of an analytical laboratory for the provincial government; and the undertaking of a geochemical survey of identifying target areas for detailed exploration work.



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